

Subject:

19, 20

الرياضيات

Date:

/ /

$$الف) y^3 - x = 2x^2 \xrightarrow{x_1 = x_2} y_1^3 - x_1 = y_2^3 - x_2 \rightarrow y_1^3 = y_2^3$$

$$\rightarrow y_1 = y_2 \rightarrow \text{تابع است}$$

$$ب) |y| + x^2 = x + 3 \xrightarrow{x=1} |y| = 1 \rightarrow y = \pm 1 \rightarrow \text{تابع نیست}$$

$$ج) \sqrt{x-4} + |y-2| = 0 \rightarrow \sqrt{x-4} \geq 0, |y-2| \geq 0 \rightarrow \sqrt{x-4} + |y-2| = 0 \rightarrow \sqrt{x-4} = 0, |y-2| = 0 \rightarrow x=4, y=2 \rightarrow \frac{4}{2} \rightarrow \text{تابع است}$$

$$د) x = \cos y \xrightarrow{x=\frac{1}{2}} \cos y = \frac{1}{2} \rightarrow y = \frac{x}{\varepsilon}, \frac{\sqrt{x}}{\varepsilon}, \dots \rightarrow \text{تابع نیست}$$

$$الف) y = \frac{x+\varepsilon}{x^2-\varepsilon x} \quad x^2 - \varepsilon x \neq 0 \quad x(x-\varepsilon) \neq 0$$

$$D_f = \mathbb{R} - \{\varepsilon, 0\}$$

$$ب) y = \frac{x+\varepsilon}{x^2-\sqrt{x}+19} \rightarrow \Delta = b^2 - 4ac = 1 - 4 \cdot 19 = -75 \rightarrow \Delta < 0$$

دسته اول: تابعی که در تمام حقیقیات تعریف شده است.

$$ج) y = \frac{x+\varepsilon}{x^2+x+\varepsilon} \rightarrow D_f = \mathbb{R}$$

$$د) y = \frac{x+\varepsilon}{x^2-\varepsilon x} = \frac{x+\varepsilon}{x(x-\varepsilon)} \rightarrow D_f = \mathbb{R} - \{0, \varepsilon\}$$

نقطه 0 و ε حذف شده است.

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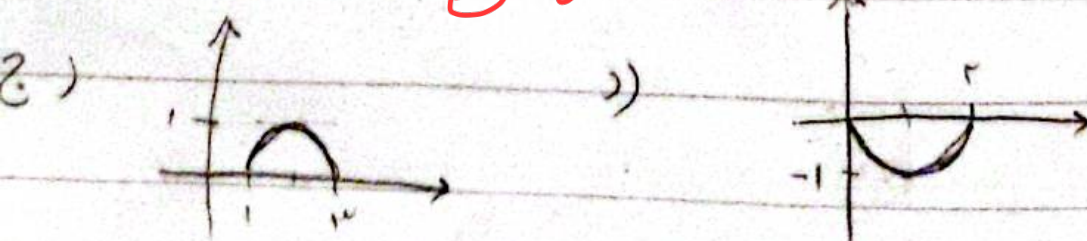
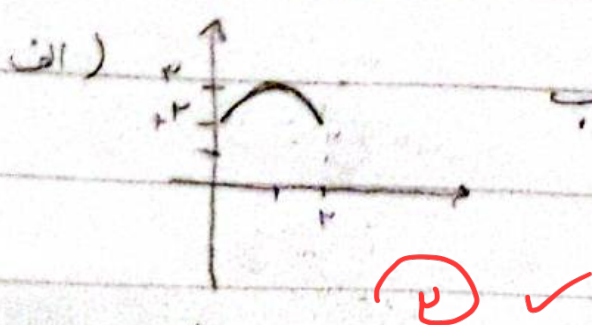
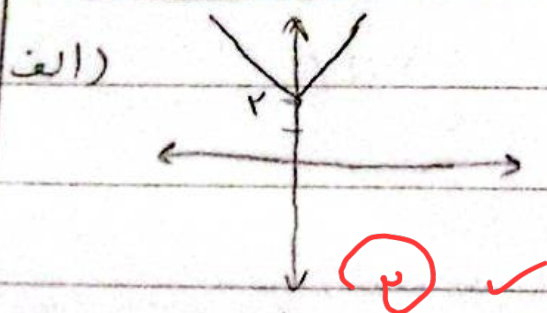
الف) $y = \sqrt{4-x} + \sqrt{x-2}$ $\begin{cases} 4-x \geq 0 \rightarrow x \leq 4 \\ x-2 \geq 0 \rightarrow x \geq 2 \end{cases} \rightarrow 2 \leq x \leq 4$
 $\rightarrow D_f = [2, 4]$ ✓

ب) $y = \frac{x^2+1}{x^2+1}$ $\rightarrow D_f = \mathbb{R}$ ✓

(1.10)

ج) $y = \frac{\sqrt{x-2}}{x-2}$ $\rightarrow x-2 \neq 0 \rightarrow x \neq 2, x-2 \geq 0 \rightarrow x \geq 2$
 $\rightarrow D_f = [2, +\infty) - \{2\}$ ✓

د) $y = \frac{x^2+1}{|x|+x^2}$ $\rightarrow D_f = \mathbb{R} - \{0\}$



الف) $y = (x-2)(x-3)(x-4) \rightarrow x=2 \quad x=3 \quad x=4$ -4

$\begin{array}{ccc} 2 & 3 & 4 \\ - & + & - & + \end{array}$

(بسته شده)

ب) $y = (x-2)(x-3)^2(x-4) \rightarrow x=2 \quad x=3 \quad x=4$

$\begin{array}{ccc} 2 & 3 & 4 \\ + & - & - & + \end{array}$

(بسته شده)

الف) $y = \frac{(x-2)(x-4)}{x-3} \quad x=2 \quad x=4 \quad x=3$ -4

$\begin{array}{ccc} 2 & 3 & 4 \\ - & + & - & + \end{array}$

(مخرج صفر)
 (تقریب شده)

ب) $y = \frac{(x-2)(x-4)}{(x-3)^2} \quad x=2 \quad x=4 \quad x=3$

$\begin{array}{ccc} 2 & 3 & 4 \\ + & - & - & + \end{array}$

(تقریب شده)

الف) $y = \frac{x^3 - 3x + 2}{x-3} \rightarrow 1 \cdot 3 + 2 = 5$ -4

$\begin{array}{ccc} 2 & 3 & 4 \\ + & - & - & + \end{array}$

(تقریب شده)

ب) $y = \frac{x^3 - 3x + 2}{x-1} \rightarrow 1 \cdot 1 + 2 = 3$ -4

$\begin{array}{ccc} 2 & 3 & 4 \\ + & - & - & + \end{array}$

(تقریب شده)

$$b) y = \frac{x^2 - 13x + 2}{x^2 - 5x + 2} = \frac{(x-1)(x-2)}{(x-3)(x-1)}$$

$\downarrow$ $\downarrow$
 3 1

$$\begin{array}{c} 1 \quad 2 \quad 3 \\ + \quad + \quad - \quad + \\ \hline + \quad + \quad - \quad + \end{array}$$

توزیع
توزیع

$$c) y = \frac{x^2 - x^2}{x^2 + x + 2} = \frac{x^2(x^2 - 1)}{x^2 + x + 2}$$

$\downarrow$ $\downarrow$ $\downarrow$
 1 -1 1

-1 داره سه تا

-9

(1.5)

$$b) y = \frac{x^2 + 3x + 2}{x^2 + 2x + 2}$$

$\Delta = 9 - 16 = -7 < 0$ → صفر نمی شود
 $\Delta = 4 - 12 = -8 < 0$ → صفر نمی شود

هرگز صفر نمی شود

در فضای حقیقی
مثبت است

$$c) y = \sqrt{\frac{x^3 - 1}{x^3 - x}} = \sqrt{\frac{x^3 - 1}{x(x^2 - 1)}} = \sqrt{\frac{x^3 - 1}{x(x-1)(x+1)}}$$

$x=1$
 $x=-1$
 $x=0$

-10

$$D_f = (-\infty, -1) \cup (0, 1) \cup (1, +\infty)$$

$$b) \sqrt{\frac{x^2 - 14}{x^2 - 5x + 2}} = \sqrt{\frac{x^2 - 14}{(x-1)(x-2)}}$$

$\downarrow$ $\downarrow$
 1 2

$$D_f = (-\infty, -4] \cup (1, 2) \cup (2, +\infty)$$